



## **AMP2-AM Series**

### **(AMP2-AMVU and AMP2-AMPPM)**

2U Analog Monitor Speaker Unit with  
Two VU or PPM Mechanical Level Meters,  
Two Balanced and Two Unbalanced Inputs,  
Two Loop-Thru Outputs, and Phase Indication

Document P/N 821540 Rev. A

## **User Manual**

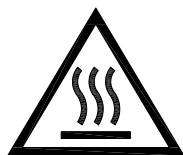
### **CONTENTS**

<b><u>Title and Contents</u></b> .....	1
Introduction .....	2
<b><u>Section 1: General Features and Specs</u></b> .....	3
General Description and Features .....	4
Applications and General Specifications .....	5
<b><u>Section 2: Operation</u></b> .....	7
Installation .....	9
Front Panel Features .....	10
Rear Panel Features .....	12
<b><u>Section 3: Technical Information</u></b> .....	15
General Technical Observations .....	16
PPM Meter Specifications and Level Threshold Settings .....	17
VU Meter Specifications and Level Threshold Adjustment .....	17
AMP2-VM Series Interconnect Block Diagram .....	18

# Important Safety Instructions

- 1) Read these instructions.
- 2) Keep these instructions.
- 3) Heed all warnings.
- 4) Follow all instructions.
- 5) Do not use this apparatus near water.
- 6) Clean only with dry cloth.
- 7) Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
- 8) Do not install near any heat source such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- 9) Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- 10) Protect the power cord from being walked on or pinched, particularly at plugs convenience receptacles and the point where they exit from the apparatus.
- 11) Only use attachments/accessories specified by the manufacturer.
- 12) Use only with the cart stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
- 13) Unplug this apparatus during lightning storms or when unused for long periods of time.
- 14) Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as when power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
- 15) Do not expose this apparatus to rain or moisture.
- 16) The apparatus shall be connected to a mains socket outlet with a protective earthing connection.

## CAUTION!



In products featuring an audio amplifier and speakers, the surface at the side of the unit, where the audio amplifier heat sink is internally attached, may get very hot after extended operation. When operating the unit exercise caution when touching this surface and ensure that external materials which may be adversely affected by heat are not in contact with it. There is a Hot Surface label (see diagram) attached to the aforementioned surface of the product.

## Introduction

Congratulations on your selection of a Wohler Technologies product. We are confident it represents the best performance and value available, and we guarantee your satisfaction with it.

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# Section 1

## **General Features and Specifications**

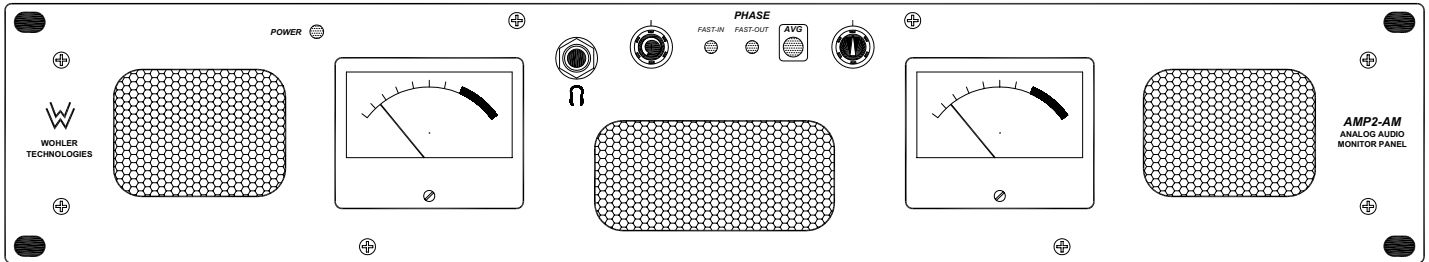
**Description  
Features  
Applications  
Specifications**



## AMP2-AM Series

### Powered Analog Audio Monitor

Featuring Models: **AMP2-AMVU** and **AMP2-AMPPM**



AMP2-AMVU or AMP2-AMPPM Front Panel

### Description

The **AMP2-AM** series analog monitor is a complete, exceptionally high quality analog stereo audio monitoring system in a compact, two rackspace cabinet. It contains three audiophile-quality drivers and three power amplifiers; two amplifiers (and two speakers) that reproduce midrange and high frequency information in stereo, and a third amp/driver combination (and speaker) that handles summed Low Frequency (LF) information below the 500 Hz crossover point. The AMP2 series unique audio design has two important advantages. First, it provides optimally focused sound in an Ultra Near Field™ (1 to 3 feet) environment. This allows higher SPL for the operator while reducing overall ambient sound and adjacent bay crosstalk. Second, electronic rather than acoustic cancellation of bass frequencies provides positive audible detection of reversed polarity (“out of phase”) audio feeds. A unique LED display also visually shows “phase” (polarity) relationships of the signals being monitored.

All AMP2 series monitors come equipped with a ganged stereo volume control and balance pot, power indication LED, and headphone output. Output limiter circuits are incorporated to protect the speakers, and extensive magnetic shielding allows placement immediately adjacent to video monitors with no color impurities.

The **AMP2-AM** series models are specifically intended for those who prefer mechanical level meters when visually monitoring audio signals. These units are capable of audibly monitoring two analog source channels through their stereo speaker systems while simultaneously visually monitoring both channels via the two front panel mounted premium quality mechanical level meters. The **AMP2-AMVU** model utilizes mechanical meters exhibiting **VU** ballistic characteristics while the **AMP2-AMPPM** model utilizes mechanical meters exhibiting **PPM** ballistic characteristics with a choice of EBU or BBC scales..

Rear panel features on both models include two analog inputs on balanced XLR connectors, two loop-through outputs on two XLR connectors, and two analog inputs on unbalanced RCA phono connectors.

### Features

- 104 dB SPL at two feet
- Only two rack spaces high
- Excellent high frequency response for positive detection of background whine and noise
- Audible and visual indication of phase/polarity problems
- Two front panel mounted mechanical level meters:
  - AMP2-PPM
    - 2 Premium PPM Meters (EBU or BBC Scales)
  - AMP2-AMVU
    - 2 Premium Quality VU Meters
- Two analog inputs on unbalanced XLR connectors
- Two analog loop-through outputs on unbalanced XLR connectors
- Two analog inputs on unbalanced RCA phono connectors
- Headphone output
- Power indication LED
- Thorough magnetic shielding
- Numerous control and input options
- Quick and easy installation: simply slide in the rack and connect audio and AC power

## Applications

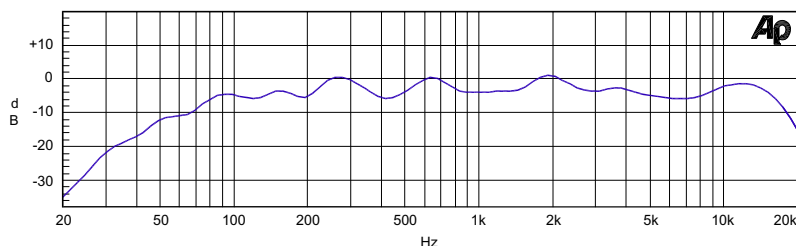
The AMP2-AM Series is ideally suited for use in VTR bays, mobile production vehicles, teleconferencing installations, multimedia systems, satellite links and cable TV facilities, and on-air radio studios. Designed and manufactured in the U.S., the AMP2-AM Series is backed by a strong warranty and a satisfaction guaranteed return policy.

## General Specifications

<b>Input Connectors:</b>	XLR (balanced) and RCA (unbalanced)
<b>Peak Acoustic Out (@ 2 ft.):</b>	104 dB SPL
<b>Power output, RMS Each Side (4<math>\Omega</math>): RMS Bass (4<math>\Omega</math>):</b>	10 W transient / 14 W continuous 25 W transient / 35 W continuous
<b>Frequency Response, Sixth Octave:</b>	80 Hz - 16 kHz $\pm$ 5 dB) (-10 dB @ 40 Hz, 20 kHz)
<b>Input Level for Maximum Output (Volume Full On):</b>	0 dBv balanced / -10 dB unbalanced
<b>Analog Input impedance:</b>	200K $\Omega$ , balanced / 40K $\Omega$ , unbalanced
<b>Hum and Noise (analog):</b>	Better than -68 dB below full output
<b>Distortion, Electrical:</b>	Less than 0.15% at any level below input threshold
<b>Distortion, Acoustic:</b>	6% or less at worst case frequencies above 120 Hz, including cabinet resonance; typically less than 1.5%
<b>Input Overload:</b>	+26 dBv balanced
<b>Converted analog out S/N:</b>	>90 dB
<b>Converted analog out THD:</b>	<0.008%
<b>Magnetic shielding:</b>	<0.8 Gauss any adjacent surface
<b>Power consumption (Average Maximum):</b>	45 W
<b>AC Mains input:</b>	100-240VAC, 50-60 Hz Universal
<b>Weight</b>	18 lbs. (8.2 kg)
<b>Dimensions (HxWxD):</b>	3.5 x 19 x 12 inches (89 x 483 x 305 mm)

**Note:** See page 17 for level meter specifications

## Audio Response Curve



**Typical 1/6 Octave Audio Response Curve**

Units are designed to meet, at time of manufacture, all currently applicable product safety and EMC requirements, such as those of UL and CE. 0 dBv ref. 0.775V RMS. Features and specifications subject to improvement without notice.



## **Section 2**

### **Operation**

**Installation**

**Front Panel Features**

**Rear Panel Features**





## Installation

### Mounting

The unit should be mounted where convenient for operating persons, ideally at approximately ear level for best high frequency response. Its superior magnetic shielding eliminates concerns about locating it adjacent to most types of CRT monitors, including even high-resolution color monitors.

### Heat Dissipation

Heat dissipated by the speaker amps is conducted directly to the left side of the chassis; no special considerations for cooling are necessary as long as the ambient temperature inside the rack area does not exceed approximately 40°C (104°F).

### Sympathetic Vibration

Sympathetic vibration from other equipment (cables, etc.,) in the rack may be serious enough to interfere with the unit's sound quality out in the listening area. The use of thin card stock and/or felt or foam weather-stripping type materials between adjacent vibrating surfaces, or tying up loose cables, etc., may be required to stop vibrations external to the unit.

### Mechanical Bracing

Even though the unit is fairly heavy, the chassis is securely attached to the front panel at eight points along its surface, not just at the four corners of the chassis ears. This feature will reduce or eliminate rear bracing requirements in many mobile/portable applications. The weight of internal components is distributed fairly evenly around the unit.

### Audio Connections

Connection of the audio feeds is straightforward. Please refer to the system interconnect block diagram on page 18 for clarification of the general signal paths into and out of the AMP2-AM series unit.

### Electrical Interference

As with any audio equipment, maximum immunity from electrical interference requires the use of shielded cable; however, satisfactory results can sometimes be obtained without it. The internal circuitry common is connected to the chassis.

### AC Power

The unit's AC mains connection is via a standard IEC inlet, with safety ground connected directly to the unit's chassis. The universal AC input (100-240VAC, 50/60Hz) switching power supply is a self-resetting sealed type, with automatic over-voltage and over-current shutdown. There is no user-replaceable fuse in either the primary or secondary circuit.

## Front Panel Features

Please refer to Figure-2a on the following page to familiarize yourself with the front panel features of the AMP2-AM Series unit. The following sections describe these features and are referenced, by number, to Figure-2a.

### 1 Speaker System

The AMP2-AM series internal **Speaker System** is comprised of two mid-range tweeter speakers (left and right) and one woofer speaker (center). The two side channel speakers reproduce, in stereo, only the mid and high frequencies. Note that the woofer speaker (center) is not a dedicated Center nor LFE speaker.

### 2 Power Indication LED

This LED glows green to indicate the AMP2-AM Series unit is connected to mains power and an operation voltage is present.

### 3 Audio Level Meters (VU or PPM)

Audio levels for the left and right analog sources are visually displayed via these two mechanical level meters. The AMP2-AMVU model uses meters exhibiting VU ballistic characteristics. The AMP2-AMPPM model uses meters exhibiting PPM ballistic characteristics. The left and right meters correlate to the left and right analog signals entering the unit.

For information about setting the Threshold Level adjustment and settings for the VU and PPM type of meter see page 17.

### 4 Headphone Jack

When headphones are plugged into this jack, the internal speakers will mute. This jack accepts a standard 1/4" phone type stereo plug.

### 5 Volume Control Pot

This controls the loudness of the audio reproduced by the internal speakers or connected headphone. Clock-wise rotation of this control increases the loudness of the monitored audio.

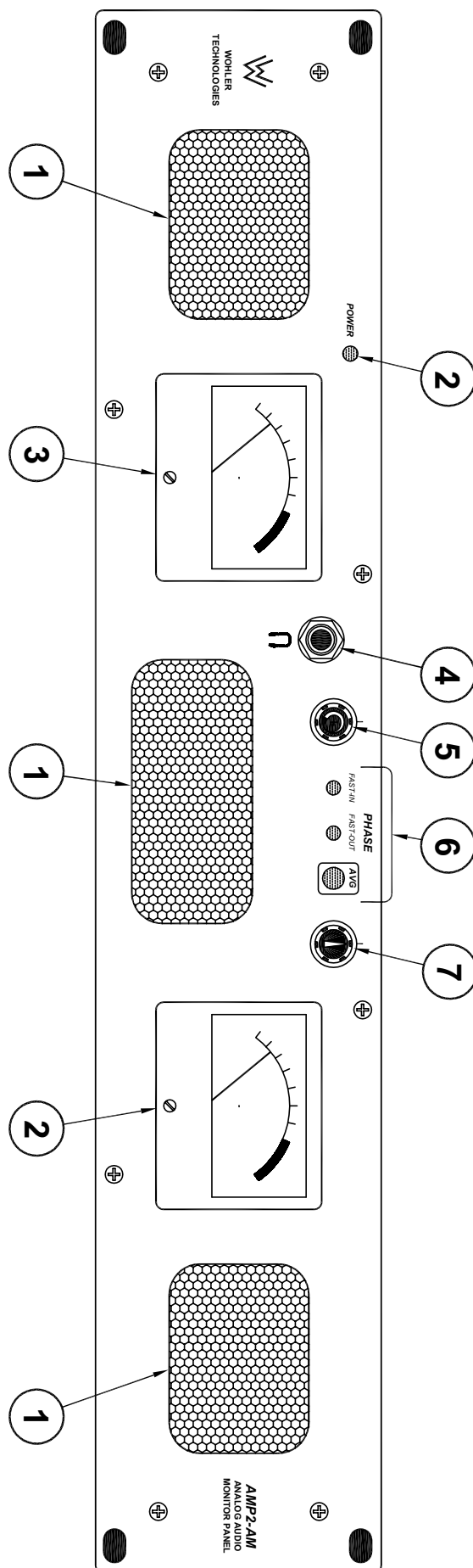
### 6 Phase Indication LEDs

These three LEDs offer instant verification of phase (polarity) conditions in the pair of channels being monitored in the Left/Right channel speakers. There are three LEDs; the two smaller LEDs labeled "**FAST IN**" and "**FAST OUT**" show instantaneous phase relationships in the signal, while the larger LED, labeled "**AVG**", will indicate the *average* phase condition. The small "**FAST IN**" LED on the left glows (or blinks) green when signals are *in-phase*. The small "**FAST OUT**" LED on the right glows (or blinks) amber for *out-of-phase* signals. The larger "**AVG**" LED indicates the *average* phase condition by glowing green for *in-phase* conditions, or red for *out-of-phase* conditions. In general, it is sufficient to regard the "**AVG**" LED (average phase condition) as adequate for proper phase monitoring. While it is normal for stereo signals to contain some intermittent instantaneous out-of-phase and in-phase conditions (small LEDs), a steady red glow of the larger LED almost always indicates an *out-of-phase* alarm condition.

### 7 Balance Control Pot

This pans the volume balance between the left and right speakers. If the balance is adjusted hard left or hard right, a slight left/right channel mix is retained (only in low bass frequencies) so that phase discrepancies can be discerned.

(Continued)



**Figure-2a: Front Panel Features**

## Rear Panel Features

Please refer to Figure-2b on the following page to familiarize yourself with the rear panel features of the AMP2-AM series unit. The following sections describe these features and are referenced, by letter, to Figure-2b.

### **A Power Connector**

Attach a standard IEC-320 power cord between this connector and mains power (100 - 250VAC, 50/60 Hz). The front panel **Power Indication LED** (Item 2, page 10) will glow GREEN to indicate operating voltages are present.

### **B Analog Input (BALANCED IN) Connectors**

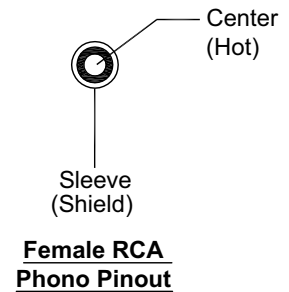
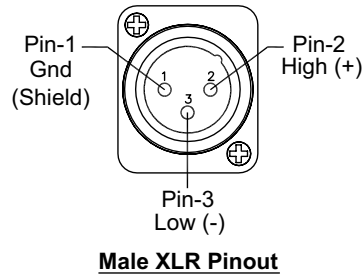
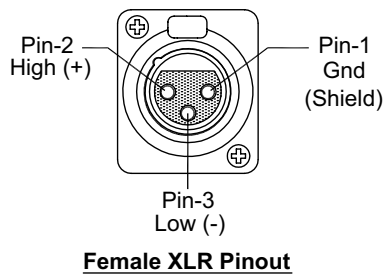
These two 3-pin female XLR connectors (left and right) accept standard analog audio signals and are configured for balanced 200K  $\Omega$  connections. Pinout information for these connectors is shown below.

### **C Analog Output (LOOP-THRU) Connectors**

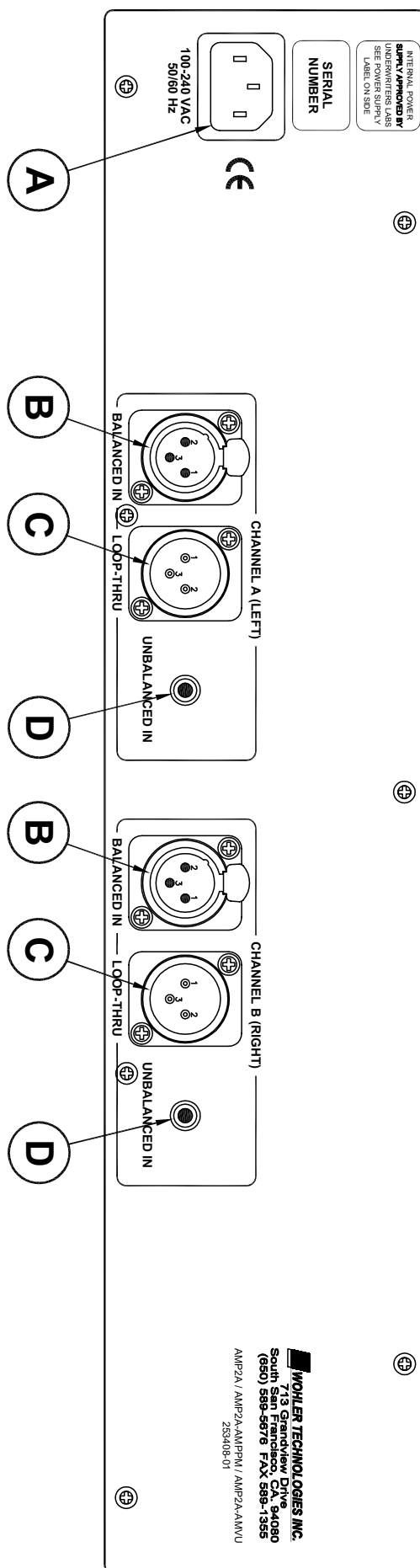
These two 3-pin male XLR connectors output an analog audio loop-through of the signals entering the inputs (Items B and D). Pinout information for these connectors is shown below.

### **D Analog Input (UNBALANCED IN) Connectors**

These two RCA Phono connectors accept standard analog audio signals and are configured for unbalanced 40K  $\Omega$  connections. Pinout information is shown below.



(Continued)

**Figure-2b: Rear Panel Features**



## Section 3

### **Technical Information**

- **General Technical Observations**
- **PPM Meter Specifications and Level Threshold Settings**
- **VU Meter Specifications and Level Threshold Adjustment**

## General Technical Observations

### General Mechanical Observations

Elimination of cabinet and component sympathetic vibrations (resonances) requires considerable attention to mechanical details. Because of this, and the physical constraints of the speaker's acoustic enclosures, even minor changes to any of the mechanical details of the unit can seriously impair its acoustic performance. This especially applies to the speaker baffles. If mechanical work on the unit is necessary, be sure to make adequate notes to permit accurate reassembly.

Unfortunately, the unusual and wholly proprietary method of magnetic shielding is usually degraded slightly by any disassembly of the unit, except removal of the rear panel. Almost any maintenance or repair will require removal of the cover. If an immediately adjacent video monitor shows magnetic interference after reassembly of the unit, it must be returned to the factory to restore the shielding completely.

### General Audio Circuitry Observations

Since a single-sided power supply is used, all amplifier sections are "biased" with a 1/2 supply reference, so all opamp signal terminals on the main board should have a DC level of +12V, +/-0.7V. Signal inputs to the main audio board from any of the input select circuits are via the balanced input stage, in lieu of the XLR analog inputs on the basic unit. Signal feed points for level meters and the phase indicator are immediately after the input stage, and before the volume control section.

The signal pick-off for the headphones is after the volume and balance controls. Speaker muting is controlled by circuitry that senses connection of headphones to the jack.

The power amps are attached to an aluminum heatsink plate (which is also connected to the circuit common for these devices). The heatsink plate forms an operational module separate from the chassis, which allows access to the solder side of the circuit board while power is applied to the circuitry. To avoid thermal shutdown of the power amp(s), they should NOT be operated without their tabs being fastened to the heatsink plate.

Variations in the frequency response of different production runs of drivers sometimes requires minor adjustments in the equalization/crossover components in individual runs of units. Some of these components may have values slightly different than those indicated in the schematic, which are the nominal ones. If any of the drivers (speakers) are replaced, it may be helpful to change some of these components to achieve maximum flatness of response.

The operating threshold of the woofer limiter is critical to both satisfactory reproduction of musical transients and preventing damage to, or destruction of, the speaker itself. The side speaker output limiter circuits are similarly important, though not as critically adjusted.

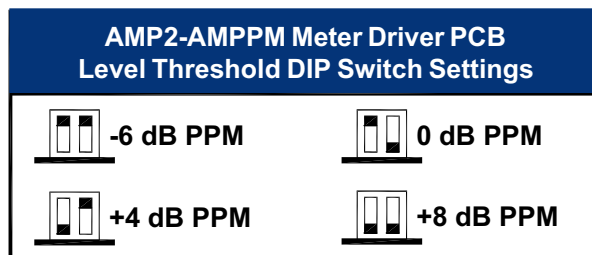
The woofer power amps are arranged in a bridge configuration; care must be taken to avoid letting EITHER speaker terminal contact the chassis (common) OR THE GROUNDED LEAD OF ANY TEST EQUIPMENT so as not to short out the power amps. The side speaker outputs are single-ended, so these precautions are not necessary for them.



## PPM Meter Specifications and Level Threshold Settings

### AMP2-AMPPM Level Threshold Settings

There are two Level Threshold DIP switches accessible through holes in the **top cover** of the AMP2-AMPPM unit; one for each of the two level meters. Each DIP switch is physically located above the level meter to which it is dedicated and each can be independently set with a possibility of four settings; -6, 0, +4, or +8 dBv. Factory setting is +4 dBv. See the diagram below for DIP switch settings.



### PPM Level Meter Specifications

Level Meter Type:	Mechanical
Level Meter Scale:	Specify BBC (1 to 7) or EBU type 1 and 2 (specified when ordered)
Level Meter Threshold:	-6, 0, +4, or +8 dBv: DIP switch selectable (top cover)
Level Meter Dynamics:	PPM

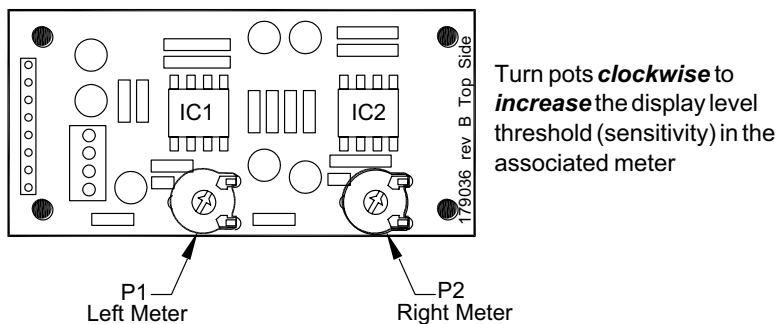
## VU Meter Specifications and Level Threshold Adjustment

### AMP2-AMVU Level Threshold Adjustment

Level Gain Calibration adjustment for the AMP2-AMVU is done by adjusting two trim pots (P1 and P2) on the level meter driver PCB (919036V). The units top cover must be removed to access this PCB, which is mounted in the center of the chassis bottom.

**CAUTION:** Be sure to follow basic safety procedures when making adjustments to internal components of a powered piece of electronic equipment.

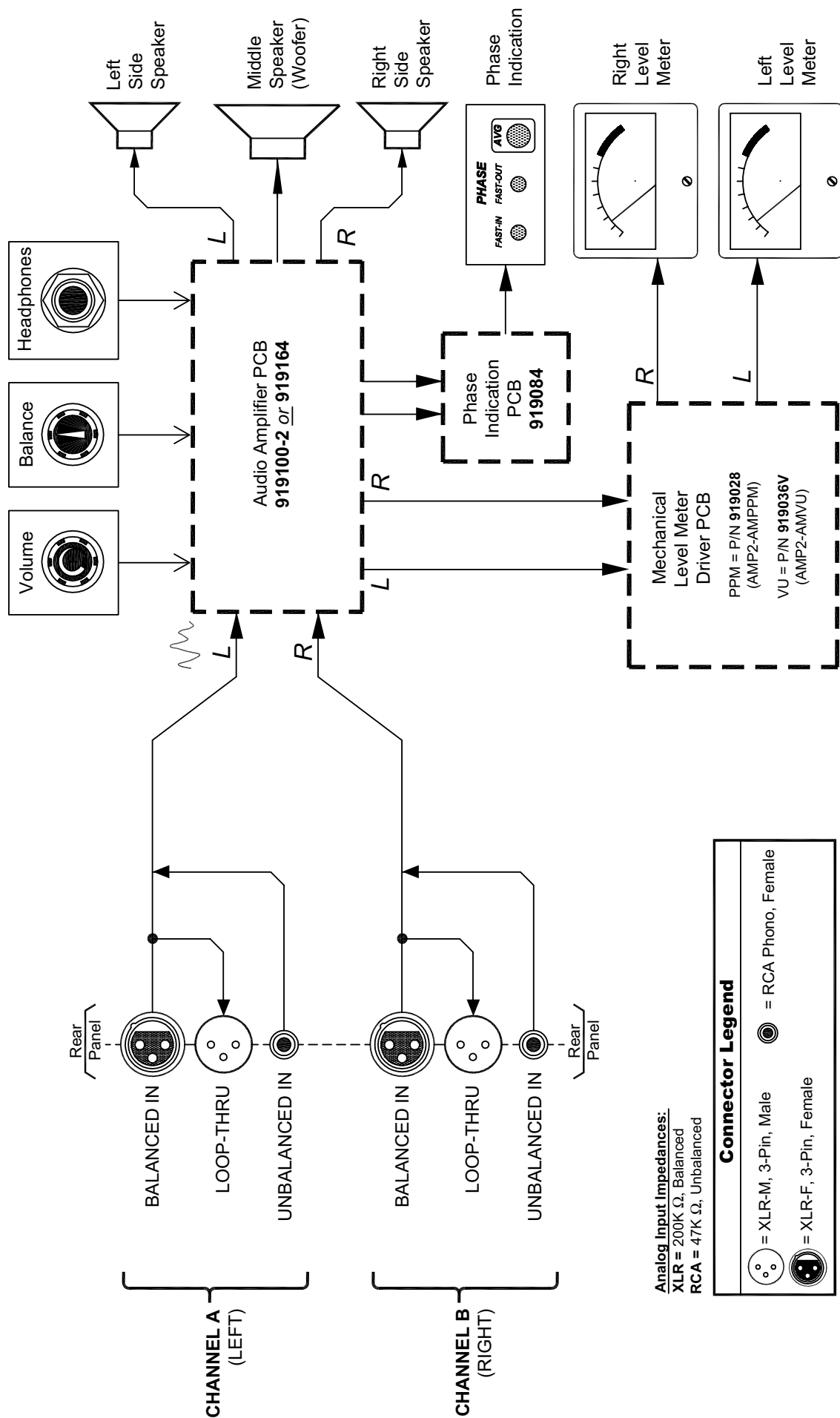
P1 adjusts the left meter; P2 adjusts the right meter. Clockwise rotation of either meter will *increase* the level of the associated meter. Adjustment range for each meter is 0 to +8 dBv.



### VU Level Meter Specifications

Level Meter Type:	Mechanical
Level Meter Scale:	Standard VU
Level Meter Threshold:	0 to +8 dBv (factory set to +4 dBv), trim pot adjustable (internal)
Level Meter Dynamics:	VU (full ANSI)

## AMP2-AM Series Interconnect Block Diagram



AMP2-AMVU and AMP2-AMPPM Interconnect Block Diagram

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